

MVR Lock and Dam Section

Lock and Dam 11 Chain Failures



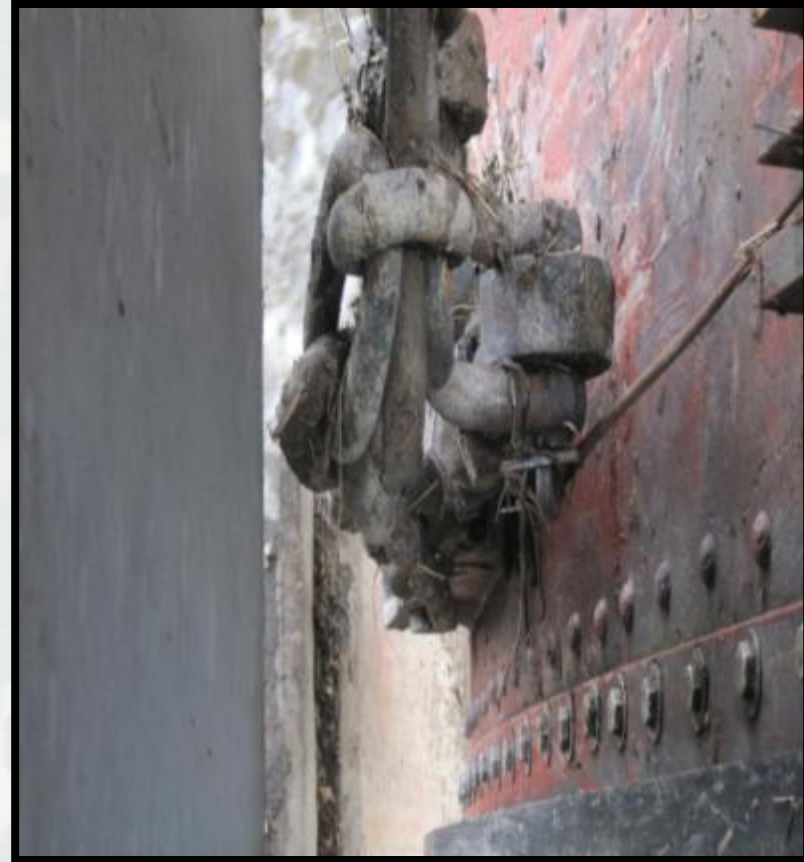
®

US Army Corps of Engineers
BUILDING STRONG®



#3 TAINTER GATE

13th Link Missing



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#5 TAINTER GATE

4TH Link Cracked



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#11 TAINTER GATE

30TH Link Cracked



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#12 TAINTER GATE

13th Link Cracked



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#12 TAINTER GATE



**FRACTURE
LOCATION**



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#15 TAINTER GATE

17TH Link Cracked



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REPAIR ACTIONS

- Contacted OD-MV, OD-MM
- Conducted Job Hazard Analysis
- Corrective Measures
 - Forecast would keep dam out of operation.
 - Gates would be suspended to slack hanger chains.
 - Use Bridge Crane and Cantilever Man Basket to rig gate casting.
 - Hanger Bracket was rigged from Machinery Deck.



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Cantilever Man Basket



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REPAIR ACTIONS

- OD-MM provided Crew, Cantilever Man Basket, and Rigging.
 - (2) 10' Round Sling, Endless. Basket Configuration for 5' length. Capacity: 50 Ton Basket
 - (4) Shackles Capacity: 50 Ton
 - (2) Hanging Pins



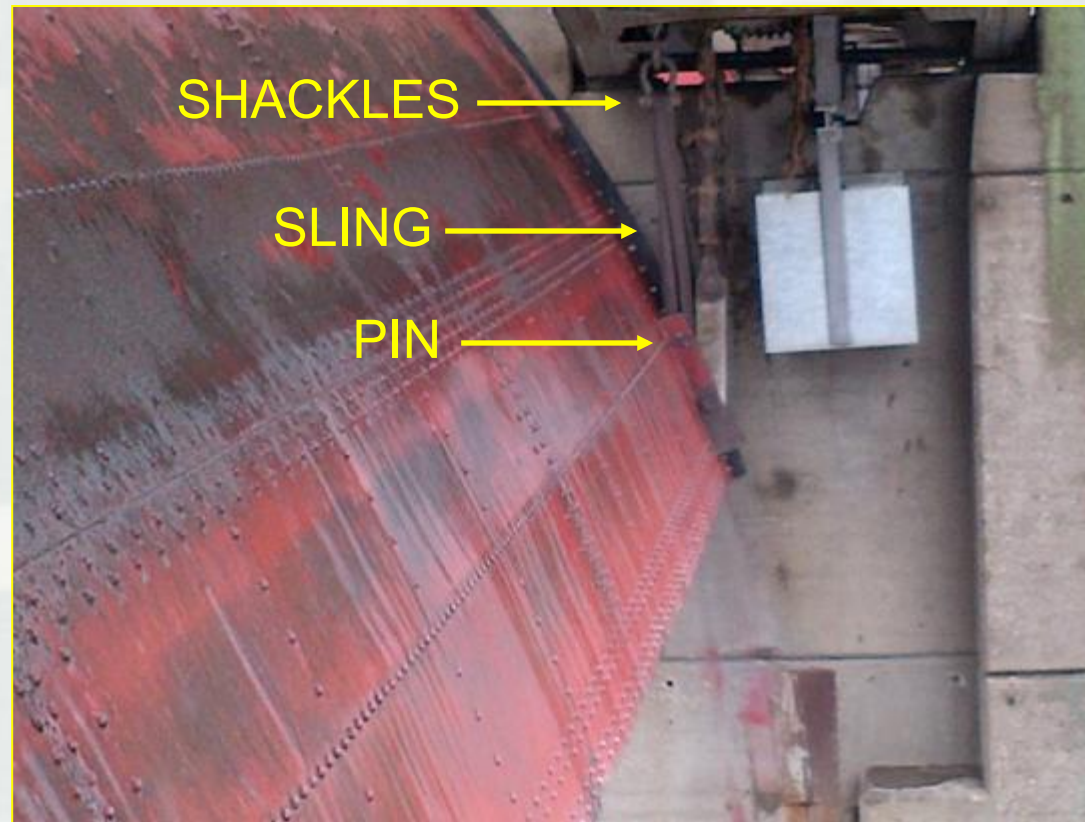
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REPAIR ACTIONS

- Suspended gate on both sides, to get slack in hoisting chains.
- Cut failed link using grinder with cut off wheel.
- Installed Repair link.



RIGGED GATE



RIGGED GATE



REPAIR LINK



REPAIR LINK



ANALYSIS

- The fracture surfaces of the chains analyzed appeared to be ductile. Chain overload is the likely cause of failure. Tensile forces from overload conditions exceeded the strength of the links in approximately the same location for each of the links.
- The failure locations in each link are areas of heavy abrasion from adjoining links and the abrasion can produce higher stress concentrations at the inside surface of the chain.



ANALYSIS

- No evidence of fatigue failure was observed. The cause of the chain overload is not known. Similarly sized chains have been installed at several other Mississippi River Lock and Dam locations and have been in service for many years without experiencing similar chain failures.



ANALYSIS

- The comparison of the chemical composition between the L/D 11 failed chain links and the L/D 11&12 spare chain links were of the same grade of material when compared to each other.
- Brinell hardness values for all chain link samples exceeded the original installation specification requirement of 340 BHN.



CHAIN COMPARISON

LD 11's



LD 12's



MAINTENANCE

- Inspect and Lubricate Chains
 - During High Water Events
 - While Completing Annual/Semi Annual Greasing
- Recommend Lubricant
 - CEN-PE-CO Eco Industrial Chain Oil



CEN-PE-CO Eco Chain Oil

It is an environmentally friendly chain oil designed for use where loss into the environment is likely. Many products claiming to be biodegradable break down into very stable byproducts that do not readily further degrade. Many other biodegradable products contain large proportions of non-biodegradable components, such as mineral oil. Cen-Pe-Co Eco Industrial Chain Oil is a crop based lubricant and over 97% of it is completely biodegradable.

